by Robert E. Graham, Jr. ☆

Measuring Regional Market Growth

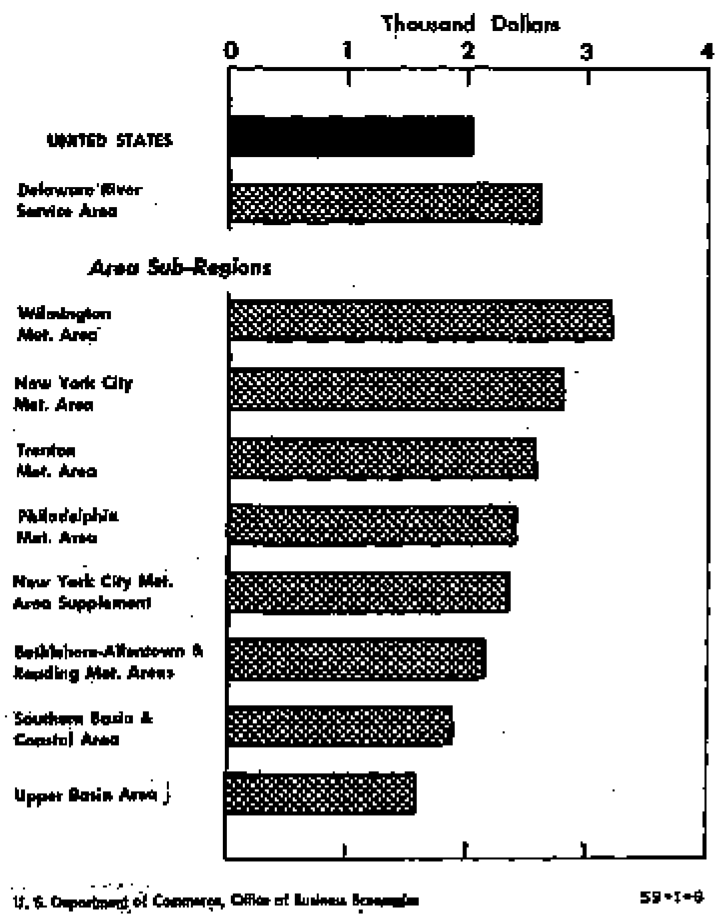
A Case Study of the Delaware River Area

ECONOMIC activity in the United States is characterized by marked differences in level and movement among geographic areas. These differences have important implications for marketing and economic development, and to the extent that they can be taken into account, the scope and quality of many types of analysis research by business will be enhanced.

Now for the first time, the Office of Business Economics has extended its basic market measure—personal income—to areas that cut across State lines. This new research was the outgrowth of a special economic survey undertaken for the U. S. Army Corps of Engineers as part of its extensive study of the water resource development of the Delaware River Service Area (DRSA). Income measures which were constructed for selected years of the period since 1929 provided the basis for charting the past and potential economic growth of the area and its eight principal subregions.

Per Capita Personal Income, 1957

Delaware River Service Area



It was recognized that the Economic Base Survey report, containing OBE's first comprehensive estimates for areas smaller than States, would prove useful in the regional measurement of economic trends. Because the complete report is not yet available, the present article provides the means for presenting the figures, summarizing the economic highlights they reveal, and describing the underlying sources of data and statistical procedures.

The description of methodology, covered in the latter part of the article, is intended to serve as a guide to those concerned with the problem of estimating the income of an area representing part of a State.

Personal income—OBE's comprehensive measure of the income receipts of individuals—provides the best available framework for gaging economic characteristics and changing patterns of growth on a geographic basis. This generalization is illustrated by our widely used State income series, which goes back on an annual basis to the late 1920's.

As summarized in the accompanying four tables, the special data prepared for the Delaware River Service Area cover the years 1929, 1940, 1950, 1955, and 1957. The area surveyed includes 49 counties, extending from just north of New York City through New Jersey and Delaware and into the eastern part of Pennsylvania. The specific counties comprising the Delaware Area and each of the eight subregions are listed in the insert on page 16.

ECONOMIC DIMENSIONS OF THE AREA

Geographically, the Delaware Area comprises less than 1 percent of the Nation's land surface but economically it bulks large from both a production and market standpoint. In 1957, the area's 22 million residents received $57 billion of personal income, an average of $2,600 per person. These two factors—a large income aggregate cumulated in a relatively small geographic area and a per capita income one-fourth higher than the national average—make this section a large concentrated market of exceptionally high quality.

The summary income figures for 1957 are given in table 1. In this, the Delaware and its subregions are compared with the United States and the Mideast region. The latter—in which the Delaware River Service Area is located—is one of

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the eight regional groupings used by OBE in its State income reports, and includes New York, New Jersey, Pennsylvania, Delaware, Maryland, and the District of Columbia.

Subregional economies differ widely

Among individual subregions, there is wide variation in market characteristics. As shown in the table, the two large metropolitan areas centering on the cities of New York and Philadelphia, with a combined aggregate of nearly $50 billion, account for one-seventh of all income in the country and more than four-fifths of the area total. The other 6 subareas may appear small in relation to New York and Philadelphia, but they receive more than $8 billion, or about 2½ percent of national personal income.

Although the distribution of income and purchasing power within the Delaware Area reflects primarily the location of population, there are significant differences in average income levels. These are depicted in the chart. By subareas, per capita incomes in 1957 ranged from $3,200 in the Wilmington Area to $1,575 in the Upper Basin. They involved a spread from three-fifths above to one-fifth below the national average.

Income sources

Because of its comprehensiveness, personal income constitutes a major purchasing power guide which can be used directly to measure the size and quality of consumer markets. Moreover, its usefulness as a tool of economic analysis is augmented by reason of the significant categories into which the overall totals can be classified. The breakdowns according to both type of income and industrial source—as shown in table 4—illustrate this aspect of its utility. For convenience, major income components in 1957 are expressed as percentages of aggregate income or earnings in table 2.

Types of income

From a type-of-income standpoint, there is a substantial degree of similarity between the overall Delaware Area and the country as a whole. Chief differences relate to the lesser importance in the area of proprietors' income—the net earnings of unincorporated business enterprises—and to the comparatively large fraction of the total derived from property incomes in the form of rents, dividends, and interest.

The former difference reflects primarily the minor emphasis placed by the Delaware economy on farming, an activity in which returns to proprietors bulk especially large. The unusual role of property income in the area is noteworthy on two counts: It is a factor in the high level of per capita incomes on the one hand; but at the same time the relative sluggishness of this income source has contributed significantly to the area's less-than-average overall economic growth.

Variations in industrial structure

Largely because of a lack of information on the industrial sources of property income, total income cannot be subdivided according to industry of origin. However, the industrial pattern that prevails in an area can be brought into focus through a breakdown of the earnings of civilians for their participation in current production. This earnings measure covers wages and salaries, other labor income, and proprietors' income. With civilian earnings making up four-fifths of total personal income, the data in tables 2 and 4 afford a comprehensive picture of the broad industrial structure of the economy of the DRSA and its subregions.

In the Delaware Area, commodity-producing industries (mainly farming, mining, and manufacturing) and government account for somewhat less-than-average proportions of civilian earnings. Conversely, the distributive and service industries each contribute above-average proportions. These differences in industrial composition are traceable to the primarily urban nature of the Delaware Area economy, as well as to certain special features centering in the large New York City Metropolitan Area.

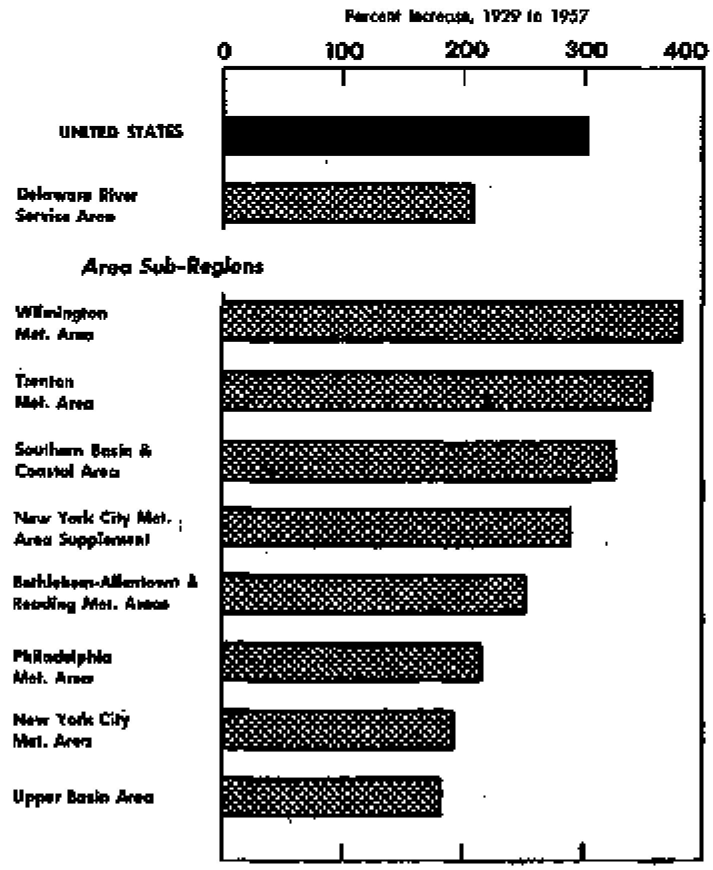
Particularly noteworthy is the relative absence of extractive industries in the Delaware Area as a whole. Also, government is of somewhat below-average importance as a source of total earnings, primarily because of the comparative role of Federal installations.

The above-average contribution of the distributive and services industries reflects to a large degree the economic specialization of the New York Metropolitan Area as an office and headquarters center; a nucleus for business, professional, and trade union associations; a world financial and political center; and a great tourist attraction.

Other subareas of the DRSA also have unique characteristics of industrial structure. For example, the Upper Basin and the Southern Basin and Coastal areas are considerably more agricultural than the region as a whole. In addition, the Upper Basin relies heavily on mining as an income source. These two areas and the Trenton Metropolitan Area, it may be added, derive an unusually small proportion of personal income from returns on invested capital.

Long-Term Growth in Personal Income

Delaware River Service Area



U. S. Department of Commerce, Office of Business Economics 59-1-7

Table 1.—Total and Per Capita Personal Income, 1957

	Total income: Amount (millions)	Total income: Percent of U. S.	Per capita income: Amount (dollars)	Per capita income: Percent of national average
United States	343,272	100.00	2,027	100
Mideast	87,901	25.46	2,394	118
Delaware River Service Area	57,295	16.69	2,600	128
New York City Metropolitan Area	39,133	11.33	2,800	138
New York City Supplement	2,892	.84	2,358	116
Bethlehem-Allentown-Reading Areas	1,745	.51	2,150	106
Trenton Metropolitan Area	652	.19	2,575	127
Philadelphia Metropolitan Area	9,931	2.89	2,400	118
Wilmington Metropolitan Area	1,096	.32	3,200	158
Upper Basin Area	888	.26	1,575	78
So. Basin and Coastal Area	907	.26	1,875	93

Source: U. S. Department of Commerce, Office of Business Economics.

Also striking is the high degree of industrialization that characterizes 5 of the subregions. In each of them manufacturing makes up from two-fifths to one-half of all civilian earnings—a feature almost completely hidden in the overall area totals by the less-than-average role in manufacturing in the New York City Metropolitan Area.

SUMMARY OF MARKET GROWTH

Particularly important in market analysis or general regional economic studies is an appraisal of shifts in the geographic distribution of income. Such information is essential in locating and measuring changes in consumer markets. Moreover, income changes are the primary indicators of developing strengths and weaknesses in an area's economy, either directly or in relation to the larger regional or national scene.

Economic gains impressive

The central feature of economic change in the Delaware Area over the past three decades has been tremendous expansion. From 1929 to 1957, population increased by 5 million; average incomes more than doubled—rising from $1,136 to $2,600; and total income surged up from $19 billion to $57 billion.

While these impressive changes in personal income reflect the large advance in prices over this period, gains in real terms have been quite substantial. After allowance for the increase in consumer prices, the purchasing power of incomes in the Delaware Area in 1957 was more than four-fifths over 1929 in the aggregate. When account is taken of the large population growth, which was a prime factor underlying the overall economic gain, real income per capita in the Delaware Area shows a rise of about one-third over the span since 1929.

The strong economic growth in the DRSA since 1929 is part of a national development. However, there were factors at work that made for sizable differences in rates of growth between the area and the Nation as well as among the individual subregions. These differences are portrayed in the chart and in table 3.

The $38 billion income expansion in the Delaware Area from 1929 to 1957 is large. In relative terms it represents a gain of 200 percent, a record that approximates that of the Mideast region as a whole but one that falls short of the 300-percent expansion scored by the Nation.

In assaying the below-average rate of growth that has characterized the economy of the Delaware Area over the long term, two related facts should be taken into consideration. The DRSA is a highly developed region, forming one of the largest concentrated markets in the world. Over the past three decades the faster rates of economic growth have occurred in the newer, less highly developed parts of the country—mainly the South and West.

As noted, measures of income growth from 1929 to 1957 for individual subregions are listed in table 3. Relative increases were largest in the Wilmington and Trenton subregions, where rates of expansion in aggregate income were well above the national figure; the gains recorded for the New York City Metropolitan Area, the Philadelphia Metropolitan Area, and the Upper Basin were least among the subregions. In both the Southern Basin and Coastal Area and the New York City Supplement, income expansion approximated the nationwide rate, while in the Bethlehem-Allentown-Reading areas it was significantly less.

Table 2.—Sources of Personal Income in the Delaware River Service Area: Percent Distribution by Type and by Industry, 1957

	Total income by type							Civilian earnings by industry										
	Total income	Wage and salaries	Other labor income	Proprietors' income	Property income	Transfer payments	Less: Personal contributions for social insurance	All industries	Farms	Mining	Contract construction	Manufacturing	Trade	Finance	Transportation, communications, and public utilities	Services	Government	Other
United States	100.0	68.2	2.6	12.5	13.4	6.3	1.8	100.0	5.2	1.8	6.7	31.1	18.4	4.7	8.2	11.8	16.8	0.3
Delaware River Service Area	100.0	69.9	2.7	8.4	14.9	5.6	1.4	100.0	.7	.2	5.7	32.5	20.9	6.7	8.6	14.8	9.6	.2
New York Metropolitan Area	100.0	70.1	2.6	8.8	15.1	5.4	2.0	100.0	.2	.1	6.2	29.7	22.4	7.8	8.0	16.0	9.5	.1
New York City Supplement	100.0	66.4	2.4	10.7	16.7	4.7	1.8	100.0	1.9	.1	9.0	38.3	16.3	3.7	5.2	14.4	10.8	.4
Bethlehem-Allentown-Reading Area	100.0	69.7	3.5	8.3	14.0	6.2	1.6	100.0	2.3	.3	5.9	52.0	14.9	2.9	7.1	8.6	5.6	.8
Trenton Metropolitan Area	100.0	73.6	3.1	3.4	11.7	6.0	1.8	100.0	.5	.1	6.0	39.9	16.2	2.5	6.6	13.5	13.8	.1
Philadelphia Metropolitan Area	100.0	71.1	2.9	8.4	13.0	6.7	1.7	100.0	.8	.2	6.4	37.2	18.9	6.1	8.6	12.6	10.2	.3
Wilmington Metropolitan Area	100.0	66.1	3.6	5.7	23.0	3.6	1.4	100.0	1.3	(1)	8.5	51.8	12.9	3.3	6.4	9.7	6.0	.1
Upper Basin Area	100.0	64.6	2.9	14.8	11.3	8.7	2.1	100.0	4.9	7.1	6.2	31.0	15.0	2.9	3.2	13.3	9.7	.8
Southern Basin and Coastal Area	100.0	64.9	2.4	15.0	10.9	8.5	1.8	100.0	6.6	.5	8.7	24.5	21.9	4.0	8.0	13.3	10.8	1.7

1. Less than one-tenth of one percent.

Source: U. S. Department of Commerce, Office of Business Economics.

Table 3.—Percent Increases in Selected Components of Personal Income in the Delaware River Service Area, 1929–57[1]

	Total income	Civilian earnings											Property income
		All industries	Farms	Mining	Contract construction	Manufacturing	Trade	Finance	Transportation, communications, utilities	Services	Government	Other	
United States	340	327	99	207	411	416	333	253	246	288	582	459	109
Delaware River Service Area	263	260	94	77	197	306	242	133	210	224	519	667	53
New York City Metropolitan Area	194	246	131	318	146	279	239	179	210	219	533	1,333	47
New York City Supplement	290	367	100	200	612	476	326	261	223	319	505	400	84
Bethlehem-Allentown-Reading Area	253	271	94	0	315	312	230	310	161	265	295	300	133
Trenton Metropolitan Area	348	416	100	99	175	541	363	583	414	393	480	(2)	111
Philadelphia Metropolitan Area	216	370	71	50	290	324	216	186	203	217	607	760	42
Wilmington Metropolitan Area	382	472	80	90	518	592	447	338	300	369	700	(2)	201
Upper Basin Area	182	197	65	16	463	411	248	230	140	191	180	500	56
Southern Basin and Coastal Area	325	386	124	200	455	657	384	460	397	161	281	300	120

1. Computed from data in table 4.
2. Data in base year insufficient for meaningful computation.

Source: U. S. Department of Commerce, Office of Business Economics.

Factors underlying income shifts

Much can be learned about the nature of the geographic income shifts through study of changes in major components. This examination is based on table 3, containing for the individual subregions percentage increases by types of income and by major industrial sources of the income received by individuals for participation in current production.

The main finding which emerges is a highly significant one—that the changes by subregions in income components (both by type and by industry) fall generally into the same pattern as total income. That is to say, subregional shifts in total income over the past three decades do not represent the residual effect of a netting out of diverse economic forces. Rather, the summary changes stemmed from industrial developments that were pervasive throughout the regional economies.

For the Delaware Area as a whole, conformity to pattern by individual components was outstanding. However, the impact of two sources was such as to merit special mention.

As already indicated, property income has been a major factor in the Delaware Area's less-than-average income growth since 1929. In that year, the combined total of rents, dividends, and interest accounted for 30 percent of all personal income in the area, a figure half again as large as the comparable proportion for the Nation. From 1929 to 1957, income from investments little more than doubled nationally while the flow of other income quadrupled. Moreover, in the Delaware Area itself property income expanded at a rate less than one-half that for the Nation.

The all-important manufacturing industry, on the other hand, has been a strongly buoyant force on overall income growth. Over the past three decades, individuals' earnings in manufacturing in the Delaware Area have quadrupled while income from all other sources has tripled.

	Percent of total income received in the Delaware Area from—	
	Manufacturing earnings	Property income
1929	20	30
1957	26	16

Since 1929, aggregate earnings of persons engaged in manufacturing have replaced property income as the largest element in the personal income flow in the Delaware Area. As shown by the following figures, the roles of invested capital and the manufacturing industry in 1957 were the reverse of those in 1929.

Because of the lessened importance in the Delaware Area of what has been a relatively sluggish income source and because of the increased importance of one of the most expansionary income flows, it is reasonable to assume that these two sources which currently account for two-fifths of all personal income in the area will operate in the future to reduce the gap that has existed between the rate of income growth in the Delaware Area and in the Nation.

Industrial growth by subregions

Comparison of the income source patterns of the various subregions as given in table 3 shows that the foregoing description of developments in the overall Delaware Area covers adequately the economic record of 4 of the 8 subregions. These include the three centering on the cities of New York, Philadelphia, and Bethlehem-Allentown and Reading as well as the Upper Basin Area.

In the Wilmington and Trenton subregions, where personal income rose most over the 1929–57 span, nearly all major income sources moved up at rates exceeding those in the country as a whole. As in the DRSA as a whole, however, property income expanded at a much slower rate than other types of income, while the upsurge in manufacturing provided the principal impetus to expansion.

The income experience of the New York City Supplement and the Southern Basin and Coastal Area represents a substantial departure from general pattern. In both subregions, most income sources bettered the national rate of growth significantly, but in each the relative expansion in total income was held to average proportions by the smallness of the rise in some one important area of the economy. In the New York City Supplement the limiting factor was property income; in the Southern Basin and Coastal Area, it was the service industry. This latter factor reflects the high level at which the amusement and recreational phases of the service industry were operating in 1929—particularly in the resort areas along the New Jersey coast.

Table 4.—Personal Income by Type and by Industry in the Delaware

	UNITED STATES					DELAWARE RIVER SERVICE AREA				
	1929	1940	1950	1955	1957	1929	1940	1950	1955	1957
Personal Income	85,661	78,522	225,473	306,598	345,272	18,620	15,762	38,373	51,167	57,296
By Type (millions of dollars)										
Wages and salaries	50,219	49,614	145,083	208,036	236,497	10,706	10,081	28,910	35,739	40,031
Other labor income	661	697	3,933	7,126	8,947	123	162	716	1,240	1,436
Proprietors' income	14,769	18,010	36,140	41,421	42,601	2,003	1,748	4,149	4,665	5,114
Farm	5,968	4,568	13,285	11,767	11,398	95	86	259	314	186
Nonfarm	8,791	9,442	22,855	29,654	31,403	1,908	1,661	3,884	4,351	4,927
Property income	18,606	12,769	23,306	37,690	42,864	5,558	3,396	5,970	7,539	8,524
Transfer payments	1,495	3,114	14,968	17,471	21,427	242	598	2,320	2,698	3,196
Less: Personal contributions for social insurance	139	456	2,858	5,155	6,654	31	140	436	896	1,085
Civilian earnings [1]	65,380	62,631	180,945	249,101	279,398	12,801	11,935	30,460	41,246	46,097
By Industry (millions of dollars)										
Farms	7,269	5,403	16,020	14,497	14,450	100	141	382	332	310
Mining	1,594	1,307	3,667	4,224	4,892	69	47	119	106	122
Contract construction	3,670	2,444	10,738	16,357	18,763	878	487	1,713	2,406	2,607
Manufacturing	16,820	16,320	52,870	77,221	86,831	3,678	3,412	9,924	13,400	14,995
Wholesale and retail trade	12,367	12,620	37,926	49,616	54,147	2,877	2,732	7,121	8,741	9,824
Finance, insurance, and real estate	3,751	2,892	7,031	11,261	12,300	1,079	906	1,885	2,774	3,105
Transportation, communications, and public utilities	6,591	5,479	16,167	20,277	22,945	1,283	1,066	2,672	3,517	3,972
Services	8,518	7,708	20,962	28,385	33,034	2,112	1,612	4,378	5,037	6,842
Government	4,629	7,847	16,989	26,351	30,161	716	1,241	2,301	3,852	4,429
Other	181	173	587	842	955	12	12	57	83	92
Per capita income (dollars)	703	595	1,491	1,866	2,027	1,138	890	1,929	2,367	2,600

	TRENTON METROPOLITAN AREA					PHILADELPHIA METROPOLITAN AREA				
	1929	1940	1950	1955	1957	1929	1940	1950	1955	1957
Personal Income	143	145	436	577	652	3,161	2,580	6,612	8,985	9,801
By Type (millions of dollars)										
Wages and salaries	91	93	312	420	474	1,846	1,692	4,491	6,420	7,109
Other labor income	1	1	9	16	30	19	24	126	235	286
Proprietors' income	14	16	38	52	55	304	284	713	807	838
Farm	1	1	4	3	2	23	19	50	44	37
Nonfarm	14	16	34	49	53	282	265	663	763	801
Property income	30	27	51	66	70	954	508	900	1,192	1,364
Transfer payments	2	4	30	33	39	42	95	472	475	374
Less: Personal contributions for social insurance	(2)	2	4	10	12	4	21	80	149	170
Civilian earnings [1]	106	115	359	486	547	2,180	1,993	5,212	7,247	8,025
By Industry (millions of dollars)										
Farms	2	2	6	5	4	28	32	81	72	65
Mining	(2)	(2)	(2)	(2)	(2)	9	4	9	10	12
Contract construction	12	6	20	29	33	131	73	333	485	611
Manufacturing	34	41	163	197	219	779	601	1,932	2,680	2,961
Wholesale and retail trade	19	21	60	82	88	491	424	1,117	1,382	1,618
Finance, insurance, and real estate	3	8	9	16	19	143	114	234	369	407
Transportation, communications and public utilities	7	7	22	32	38	227	164	447	616	657
Services	14	15	41	62	74	318	278	646	895	1,097
Government	13	19	37	61	73	116	212	404	734	830
Other	(2)	(2)	(2)	(2)	1	3	3	9	15	17
Per capita income (dollars)	776	730	1,590	2,306	2,575	1,601	906	1,796	2,163	2,400

1. Consists of the sum of wages and salaries, other labor income, and proprietors' income.
2. Less than $500,000.

Source: U. S. Department of Commerce, Office of Business Economics.

River Service Area and Subregions, Selected Years, 1929–57

NEW YORK CITY METROPOLITAN AREA				
1929	1940	1950	1955	1957
13,324	11,130	28,465	34,415	38,122
7,616	7,062	17,986	24,502	27,426
91	111	486	825	1,004
1,446	1,224	2,747	3,249	3,438
12	13	46	37	37
1,436	1,210	2,701	3,212	3,401
4,008	2,460	4,166	6,726	5,910
185	806	1,419	1,717	2,114
23	103	243	604	769
9,140	8,394	21,088	28,326	31,435
29	29	76	65	67
11	11	28	39	46
462	329	1,121	1,616	1,828
3,465	2,206	6,382	8,437	9,887
2,038	2,057	5,284	6,427	7,079
887	749	1,646	2,230	2,479
917	777	1,827	2,502	2,641
1,581	1,420	3,248	4,464	5,047
477	806	1,627	1,607	3,090
2	5	80	39	43
1,262	966	2,041	2,621	2,800

NEW YORK CITY SUPPLEMENT				
1929	1940	1950	1955	1957
742	695	1,789	2,549	2,893
385	428	1,149	1,594	1,921
3	5	29	54	68
61	74	216	285	309
11	10	33	28	26
70	63	183	257	282
262	176	299	424	463
11	21	96	122	160
1	6	22	40	52
480	488	1,345	1,971	2,239
21	18	49	42	42
1	1	2	3	3
26	23	89	168	176
149	163	491	748	848
85	89	249	824	342
18	14	36	67	83
48	40	87	124	139
77	77	188	287	323
40	68	159	217	242
2	3	6	9	10
969	811	1,698	2,068	2,360

BETHLEHEM, ALLENTOWN, AND READING AREA				
1929	1940	1950	1955	1957
494	467	1,216	1,542	1,745
323	329	820	1,069	1,216
3	5	27	48	61
56	62	132	144	146
13	11	28	24	20
44	40	104	120	126
105	71	166	216	245
3	16	84	90	109
1	4	14	26	31
382	385	977	1,266	1,410
17	18	42	37	33
4	2	6	4	4
20	11	50	76	68
179	376	500	645	737
62	56	164	190	210
10	9	21	26	41
26	32	71	90	101
24	35	81	109	124
20	48	49	67	79
1	1	3	3	4
796	602	1,646	1,932	2,160

WILMINGTON METROPOLITAN AREA				
1929	1940	1950	1955	1957
224	369	631	860	1,098
122	146	304	422	716
1	2	18	28	38
17	18	51	61	62
3	3	8	6	3
15	15	42	66	69
86	90	166	230	259
3	4	23	32	40
(2)	2	6	12	15
140	164	458	699	801
6	5	13	11	9
(2)	1	(2)	(2)	(2)
11	11	37	56	98
68	72	217	358	415
19	25	47	85	104
5	7	10	25	26
13	14	39	46	62
17	18	43	67	78
6	11	24	36	48
(2)	(2)	(2)	(2)	1
1,105	1,186	2,340	2,917	3,200

UPPER BASIN AREA				
1929	1940	1950	1955	1957
314	283	482	777	888
194	187	406	493	573
2	3	14	21	23
40	43	110	127	131
20	14	40	33	31
29	80	80	94	100
64	39	71	88	100
7	14	49	68	77
1	2	7	11	19
244	223	537	636	725
26	19	62	44	43
45	28	71	45	52
8	6	29	38	45
44	38	117	184	225
31	81	94	100	108
6	5	11	18	21
23	19	44	65	60
33	33	58	86	98
25	69	63	61	70
1	1	3	5	6
576	511	1,221	1,410	1,670

SOUTHERN BASIN AND COASTAL AREA				
1929	1940	1950	1955	1957
213	286	583	782	947
129	128	355	505	589
1	1	9	14	22
34	39	128	140	135
16	16	80	40	30
19	24	78	100	106
45	34	63	87	99
4	7	36	67	77
(2)	2	7	12	16
162	183	474	624	707
21	30	63	57	47
1	1	2	3	4
11	7	33	51	61
23	29	113	144	174
82	35	103	140	165
6	6	12	23	28
14	12	35	50	57
36	27	66	78	94
16	24	41	68	77
3	2	7	10	12
643	581	1,609	1,890	1,875

Sources and Methods of Estimation

The preparation of special estimates of personal income for the Delaware River Service Area and its eight subregions was a complex and technical job. Prior to undertaking this work for the Corps of Engineers, official estimates of personal income on a less-than-national basis were limited to those for the individual States.

While our long experience in State income work proved invaluable for the task at hand, and the State income estimates themselves provided a framework for the statistical procedure, the construction of income measures for the Delaware Area project involved the development of additional techniques and the assembly of a great deal of special data from a wide variety of sources.

The following summary of original data and statistical methods used is intended as an aid to the growing number of individuals and organizations concerned with the estimation of income on a less-than-State basis. This description, it is believed, will prove pertinent in almost all cases since the predominant practice in income work—and the one used here—is to obtain local area income estimates by breaking down the relevant State-wide totals.

Delaware River Service Area Subregions and Counties

New York City Metropolitan Area

NEW YORK: 5 N. Y. C. Boroughs, Nassau, Suffolk, Rockland, Westchester

NEW JERSEY: Bergen, Passaic, Essex, Hudson, Union, Middlesex, Morris, Somerset

New York City Supplement

NEW YORK: Putnam, Orange, Dutchess

CONNECTICUT: Fairfield

NEW JERSEY: Monmouth

Bethlehem-Allentown and Reading Metropolitan Areas

PENNSYLVANIA: Lehigh, Northampton, Berks

NEW JERSEY: Warren, Hunterdon

Trenton Metropolitan Area—New Jersey

Mercer

Philadelphia Metropolitan Area

PENNSYLVANIA: Bucks, Montgomery, Chester, Delaware, Philadelphia

NEW JERSEY: Camden, Gloucester, Burlington

Wilmington Metropolitan Area

NEW JERSEY: Salem

DELAWARE: New Castle

Upper Basin Area

NEW YORK: Delaware, Sullivan, Ulster

PENNSYLVANIA: Wayne, Monroe, Schuylkill, Pike, Carbon

Southern Basin and Coastal Area

NEW JERSEY: Ocean, Cape May, Atlantic, Cumberland

DELAWARE: Kent, Sussex

Main Statistical Approach

A large body of economic information on metropolitan areas, cities, and counties is available from government and business sources. These data fall generally into one of two classes. They are part of the factual array collected in the periodic industrial and population censuses of the Federal Government; or they are byproducts of the administrative functions of some operating agency or organization—governmental or private. A major example of byproduct-type material is afforded by the tabulations made by State Unemployment Insurance (UI) agencies of wages and salaries disbursed in each county of a State by employers in industries covered by State UI laws.

Although the quantity of data relevant to the measurement of personal income by counties is large, two serious deficiencies limit their usability for income estimation. Certain sizable gaps exist in data coverage. For example, information on county or other local-area distributions of dividends, interest, and rents is very sparse. Similarly, little direct information on the net income of self-employed persons is available at the county level.

Secondly, and apart from gaps in coverage, such information on economic activities as is recorded on a county basis is not done within the framework of a coordinated statistical program designed for income measurement. For the most part, reported statistical information is not directly or wholly suitable for this purpose and must be processed to adjust for differences in definition and scope. Local-area income measurement therefore becomes a twofold task: Assembling data from a multiplicity of sources and then adapting them, through estimation, in a step-by-step build up of aggregate income from component flows.

Several main aspects of the statistical approach used may be noted.

Relatively little use is made of income reports of individuals. Instead, reliance is placed on records of business and government which show disbursements made to persons. This approach, it is felt, makes for significantly greater accuracy.

The local-area estimates prepared in this study are tied directly to the Department of Commerce official estimates of personal income by States. That is, the State total for each income component as taken from the official State income series is broken down or allocated to the various counties of the State in accordance with each county's proportionate share of some related series available on a county basis.

This allocation procedure makes for greater accuracy in the county estimates because most components of personal income can be estimated more reliably for States than for smaller geographic areas. Also, it permits the utilization of numerous related series of data which do not "match" the basic series to be allocated in some respect such as definition or coverage.

Estimates based on direct, comprehensive data are generally more accurate than those which rely on indirect allocators and the direct approach has been used wherever possible. It should not be overlooked, however, that in numerous instances the State total of a component to be allocated has been derived from the same basic data sources as the allocating series. In such cases, there is no essential difference in accuracy between the State and local-area estimates.

The allocation procedure is carried out in detail. Separate estimates are made for each of more than 100 components, and total personal income is derived by summing the individual series. This particular approach accomplishes three main purposes. It permits the maximum utilization of all available sources of information and thus minimizes errors that would stem from the estimation of broad components on the basis of data differing in scope or internal composition. Secondly, the detailed method brings into play the potent factor of "offsetting errors." The tendency for errors in underlying components to compensate in the totals is a phenomenon observed repeatedly in the field of income estimation when a detailed, careful statistical procedure is followed.

Finally, a concomitant result of the use of a detailed allocation method is that it yields a considerable quantity of analytically useful information with regard to sources of income in local areas.

Because of the central place occupied by the State income estimates in this approach to local-area estimation, reference is made to our publication "Personal Income by States Since 1929," a supplement to the SURVEY OF CURRENT BUSINESS.[1] This bulletin provides a comprehensive discussion of concepts and definitions in geographic income measurement, as well as detailed explanations of the sources and methods used in preparing estimates of personal income by States. Also included, it may be noted, are full descriptions of such particular aspects of the work as "allocation" and "interpolation" and "extrapolation"—procedures referred to frequently in the following discussion.

County estimates not available

Estimates of the various income components were made on a county basis to the extent possible. Figures for the separate counties were then grouped into the eight subregions chosen for presenting the results. Although counties thus formed the basic "building blocks," estimates are not available for these units because of two factors.

First, for a number of components, the most satisfactory data on which to base an estimate were available for metropolitan areas or for groups of counties. In such instances, extension of geographic detail to the county level was sacrificed in favor of greater accuracy in the overall estimates.

Secondly, income estimates for individual counties are not shown because of the lack of requisite data for making adjustments to take account of commuting of workers across county lines. Certain income components (wages and salaries, in particular) are measured at the point of disbursement (place of work), while others (property income, for example) are estimated on a residence basis. Where workers reside in one county and work in another personal income as estimated for those counties is partly on a "where received" and partly on a "where earned" basis. Data suitable to convert the aggregate wholly to one of the two definitions are lacking. Accordingly, the commuter problem is "solved" by grouping counties into geographic areas so that commuting across area lines is at a minimum. This solution precludes the publishing of meaningful estimates for individual counties.

1. "Personal Income by States Since 1929" is available from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., or from Department of Commerce Field Offices, at $1.50 a copy.

Derivation of the Estimates

The summary of sources and methods that follows is organized in terms of the main components of personal income. These consist of wages and salaries, various types of supplementary earnings termed "other labor income," the net incomes of owners of unincorporated businesses (including farms), property income (including net rental income, dividends, and interest), and government and business "transfer payments" (consisting in general of disbursements to individuals for which no services are rendered currently, such as unemployment benefits, relief, and veterans' pensions).

Personal income is measured before deduction of income and other direct personal taxes, but after deduction of individuals' contributions to social security, government retirement, and other social insurance programs. It is a comprehensive measure which covers the income received by residents of an area from business establishments, Federal and State and local governments, households and institutions, and foreign countries.

Apart from the help which this exposition of sources and methods may afford to those interested in preparing income estimates for local areas, it provides a means of assessing reliability and of acquainting the users with the specific scope and content of individual income components. It must be emphasized, however, that the description is necessarily brief and has passed over many procedural details which will come up in the practical application of this methodology to local-area estimation.

Wage and Salary Disbursements

Estimates of wage and salary disbursements, which account for 70 percent of all personal income, are more complete and reliable than those for any other major type of income. Because of their sizable weight in the total income flow, they impart a large measure of reliability to the estimates of aggregate income.

For the years since 1950, estimates of wages and salaries have been prepared for about 40 individual industries. For 1940 and 1929, the number of separate estimates was reduced to 15 because of the smaller amount of industrial detail that characterizes the source material for earlier years.

In the following presentation, derivation of the payroll figures is discussed in two parts. The first includes industries covered by State unemployment insurance programs. The second relates to industries not covered by UI and for which other data sources were relied upon.

"Covered" Wages and Salaries

The most important source of statistical information on payrolls for the past two decades has been the data collected under State UI programs. The States of the Delaware Area furnished county tabulations by detailed industries (approximately 75) of wage and salary disbursements made by firms coming under their unemployment insurance laws. These data formed the basis of the 1940, 1950, 1955, and 1957 payroll estimates for industries making up 80 percent of all wages and salaries paid in the Delaware Area.[2]

The reporting systems that have developed under the State UI laws are comprehensive and employ regular, compulsory data submission by employers. The accuracy and completeness of reported figures are enhanced further by the fact that each "covered" firm is required to maintain a list of employees and their wages individually. Because of the nature of the reporting systems, then, the UI data approach the ideal for income estimation, and county wage and salary disbursements in industries based on these data are considered quite reliable.

The figures as reported by the individual States do not constitute a complete measure of total payrolls, mainly by reason of the fact that in New York, New Jersey, and Connecticut, establishments with less than four employees are exempt from mandatory coverage.[3] Satisfactory estimates of payrolls in these relatively small firms were derived from special tabulations of the Bureau of Old-Age and Survivors Insurance (BOASI) and added to the UI figures.

In addition to this gap in social security coverage or tabulations, minor deficiencies exist in all States. As an example, there is the problem of classifying both geographically (by counties) and industrially payrolls left unallocated by UI.

Again, in order to obtain a complete measure for industries covered wholly or in large part by the social security program, allowance must be made for certain elements in our definition of "covered" industry payrolls which are outside the scope of the State unemployment insurance laws. These elements include federally chartered credit unions, Federal Reserve banks, national banks and State banks that are members of the Federal Reserve System in New Jersey, electric railways, carrier affiliates in the transportation industry, insurance solicitors on commission basis, and employees' tips. In some instances, payrolls of these industrial segments could be estimated by counties quite readily. In others, the task was difficult and the results less satisfactory.

In the absence of State UI data prior to 1938, special methods of estimation were required to extend "covered" wages and salaries from 1940 to 1929. These methods are set forth below in summary fashion.

For wholesale and retail trade and for manufacturing, county estimates of wages and salaries in 1940 were extrapolated to 1929 by changes in payroll disbursements reported in the 1929 and 1939 censuses covering these industrial sectors. The manufacturing data required two types of adjustments. Some estimation was necessary to obtain figures for certain of the less industrialized counties, for which separate data were not shown. In addition, only selected components of factory payrolls were used in the county extrapolator as there is some question regarding comparability of data reported by the Census of Manufactures for 1939 with those reported for earlier years.[4]

The availability of census data for trade and manufacturing on a county basis gives a solid statistical basis to the county estimates of "covered" payrolls in 1929. Together these two industries in that year accounted for about two-thirds of all "covered" payrolls and about one-half of all wage and salary disbursements in the Delaware Area.

County payroll figures in 1940 for construction, transportation (excluding water and railroad), and the "covered" service industries were extended to 1929 by the product of persons in the labor force in the corresponding industry and average wages in manufacturing and trade. Numbers of persons were obtained from the 1930 and 1940 censuses of population; average earnings were computed from the industrial censuses of 1939 and 1929. The group of industries estimated in this manner comprised approximately one-fourth of "covered" payrolls in the Delaware Area in 1929.

The final two "covered" industries are mining and finance, insurance, and real estate. The 1940 estimates for each of these were moved to 1929 by county data on the total number of persons engaged in these industries in 1930 and 1940 as reported in the population censuses for those years.

"Noncovered" Wages and Salaries

County estimates of wages and salaries were prepared for each industry, or type of employment, not covered by UI data. These include farms; Federal, State, and local governments; railroads; private households; professional and related services (including medical and other health services, nonprofit membership organizations, n. e. c., and educational services, n. e. c.); water transportation; agricultural services; forestry and fisheries; and "rest of the world." The formulation of estimates for each of these industries is covered in the subsequent sections.

Government.—Benchmark estimates of government wage and salary disbursements in each Delaware Area county in 1950 were prepared from data in the census of population for that year. A county allocator for total government payrolls in each of the five States in the area was computed as the product of number of government employees by counties and their estimated total income, taken to reflect differentials in average earnings.

The number of employees was reported for each State, county, and SMA by the census. Estimated differentials in average earnings in 1949 (assumed to be the same in relative terms in 1950) for the State and each SMA were derived through calculation of arithmetic means from census data showing the distribution of government employees by total-income size classes.

Such income distributions were not available for counties. Accordingly, the combined total for all counties not part of an SMA was derived by subtraction of the estimated SMA figures from the State total. This residual was allocated in accordance with the number of government workers in each county as reported in the census. Such a procedure assumes equal average pay in the "non-SMA" counties.

The estimates derived in the foregoing manner for 1950 are quite satisfactory. Nearly 90 percent of total government payrolls in the Delaware Area in 1950 was based on reported income data, while only about 10 percent rested on a distribution of a residual based on numbers of government workers.

The 1950 figures were extended to 1929 and 1940 by means of a specially constructed extrapolator, which represents the piecing together of information from numerous and diverse sources. County distributions of wage and salary disbursements were derived for (1) Federal Government agencies, (2) State government agencies, (3) county governments, (4) municipal governments, and (5) special districts (concerned with functions such as school, sewage, or transportation). In 1950, from one-half to two-thirds of the total extrapolating series was based on reported payroll data in each State except New York, where the percentage was even higher. In 1940 the proportion varied between one-third and one-half; in 1929 there was, as might be expected, a further reduction in the portion directly reported.

The chief sources on which the extrapolating series for 1929, 1940, and 1950 were based include: (1) the 1950 Census of Population for all levels of government; (2) a report on *Federal Civilian Employment* made to the Congress of the United States in 1950 by the Joint Committee on Reduction of Nonessential Federal Expenditures; (3) the censuses of population for 1930 and 1940 which provided county distributions of the number of Federal postal employees, who accounted for two-thirds of Federal pay in 1929; (4) county distributions of civilian employees of the Defense Department derived by extrapolation from 1950 by a county series on military strength; (5) special county tabulations of State government employees from New York State; (6) the census of governments for 1932 and 1942; and (7) numerous census reports on city finances.

For 1955 and 1957, county distributions of Federal civilian payrolls were prepared from UI data which became available with the extension of UI coverage to Federal employees in 1956. Data relating to the first quarter of 1956 were used to allocate 1955 State totals, while UI data covering all 4 quarters were available for 1957. County distributions of payrolls of county and city governments and of school and other special districts were available for April of 1957 from the census of governments for that year. These distributions were used to allocate the relevant State totals in both 1955 and 1957.

For all States except New York, the 1950 county distribution of State government payrolls was extended to later years on the basis of changes in population. State government wages and salaries in New York were distributed among counties in 1955 in accordance with a county distribution of employment in that year furnished by the State of New York. This 1955 distribution was extrapolated to 1956 by changes in population and the extrapolated series used for 1957.

Direct data on military payroll disbursements are not available. Accordingly, county estimates were derived largely on the basis of military strength.

For 1940, 1950, 1955, and 1957 military payrolls were allocated in two parts. State totals of cash pay and pay in kind (clothing and food) received directly by military personnel were distributed among counties in proportion to military strength. This strength series was obtained for 1940 and 1950 from the censuses of population and from special reports of the military services for 1955 and 1957. State totals of allotments of pay made by military personnel to their dependents were allocated to counties by the sum of civilian population and military strength with each weighted equally—a formula based on State data. The small amount of military pay in 1929 was distributed among counties in the same relative proportion as estimated for 1940.

For 1940, it was necessary to allocate a special component of government payrolls not present in any other year covered by this study—wages and salaries of persons on work-relief projects. These were distributed in accordance with the numbers of persons on work relief in each county as reported in the 1940 Census of Population.

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2. Data for Pennsylvania were available for only one quarter of each year; for Delaware no UI county data were had for years prior to 1950.
3. Beginning in 1958, the UI programs in both New York and Connecticut cover establishments with three or more employees.
4. This question of comparability is discussed on pp. 79–80 of "Personal Income by States Since 1929."

Farms.—County wages and salaries in farming were measured by allocating the State totals of farm wages, as estimated annually by the U. S. Department of Agriculture, according to the county distributions of cash farm wages reported in the quinquennial censuses of agriculture, using the 1954 census for both 1955 and 1957. A sizable portion—about one-fifth—of the State totals consisted of wages in kind. Our procedure assumes pay in kind to form the same proportion of cash pay in each county.

Railroads.—For the period since 1950 county estimates of railroad wages and salaries are regarded as quite reliable. This evaluation stems from the fact that the Associated Railroad Organization of each State except that of Pennsylvania furnished a county tabulation of wages and salaries paid railroad employees in its State. These figures are based on employer reports.

In the absence of comparable information for Pennsylvania, county estimates of railroad wages and salaries in that State were prepared in the manner similar to that described below for the professional and related services industry.

County estimates in each State in 1929 (and 1940 for New Jersey) were derived by extending the 1950 estimates (1950 for New Jersey) back by relative changes in the number of persons employed in the railroad industry as reported in the censuses of population for 1930 and 1950.

Other private "noncovered" industries.—For the remaining "noncovered" industries in the private sector, county estimates of wages and salaries were based largely on data from the decennial censuses of population. Because the sources of data and methods of estimation are common to all industries discussed in this section, the following description applies to the derivation of county payroll disbursements in private households, medical and other health services, nonprofit membership organizations, private educational services, water transportation, and forestry and fisheries.

For each of these industries, benchmark distributions of payrolls disbursed in each county in 1950 were prepared. This was done by allocating the OBE State totals for individual industries among counties in accordance with the pattern exhibited by preliminary estimates based on information in the 1950 Census of Population.

The preliminary series for each industry was prepared as the product of the number of private wage and salary workers in each county and estimates assumed to represent differentials in average earnings. The number of private employees in each State of the Delaware Area and in each SMA of 100,000 or more population was tabulated directly from the 1950 Census of Population. For counties outside of SMA's, however, the employment figures in noncovered industries reflected the total labor force and not simply private employees. This county distribution was used to allocate the residual number of private wage earners calculated as the difference between the total number in the State and the number in SMA's.

Differentials in average earnings of persons in each "noncovered" industry were obtained from the 1950 Census of Population, through calculation of arithmetic means from data showing the distribution of persons by total-income size classes. Such averages could be computed only for the State as a whole and for each SMA of 250,000 or more population. An estimate of average earnings in the combined areas outside of SMA's was computed from the residual yielded by the subtraction of SMA figures from State totals. This residual average was applied to each county lying outside an SMA.

The benchmark estimates of wages and salaries in the various noncovered industries in 1950 were extended to 1955 and 1957 in one of three ways. Private household payrolls were moved forward by changes in wages and salaries in personal services (a covered industry). Nonprofit membership organizations were extrapolated by UI data which covered a substantial portion of the industry. The remaining noncovered industries were extended by changes in population.

The 1950 county estimates were moved back to 1940, industry by industry, by an extrapolating series derived as the product of number of private wage and salary workers and average wages in some related "covered" industry. The derivation of the employment series for 1950 has been described; figures on employment in 1940 were obtained from the 1940 Census of Population in a directly comparable manner. Average wages in 1940 and 1950 were computed from the UI data for the industry selected as most relevant to the noncovered industry.

The 1940 figures for noncovered industries were extrapolated to 1929 by changes in the labor force of the appropriate industry as reported in the 1930 and 1940 censuses of population.

Miscellaneous Industries

This last category of wages and salaries consists of two industries: agricultural and similar service establishments and "rest of the world." No data satisfactory for estimating their distributions by counties are available, but they are minor quantitatively. Together the two totaled only $21 million in 1957, or one-tenth of 1 percent of all wage and salary disbursements in the Delaware Service Area.

Payrolls disbursed by agricultural services establishments were allocated among counties of the Delaware Area in proportion to the distribution of the net income of farm operators (described below).

The "rest of the world" component of wages and salaries represents payments received by United States residents in this country from international organizations (such as U. N.) and foreign governments. All of this item in the Delaware Area was assigned to the New York City Metropolitan Area.

Proprietors' Income

Proprietors' income measures the net business earnings of owners of unincorporated enterprises. Farmers, independent professional practitioners (such as physicians, dentists, and lawyers), entrepreneurs in nonfarm business, and others in a self-employment status are included in the scope of proprietors' income.

Measurement of this aggregate is considerably more difficult (and less accurate) than is that of wages and salaries, because little direct information is available on proprietors' incomes by State or local areas. Such data as do exist are those contained in the 1950 Census of Population—the first census to provide information along this line. These data serve as the principal base of a series that is believed to furnish an approximation of the comparative importance of noncorporate business income in the various county or subarea totals. Estimates for years other than 1950 are based largely on indirect information and their accuracy is probably less than that of the benchmark distribution.

Two broad segments of proprietors' income may be differentiated with respect to source material and methods used—nonfarm proprietors' income and net farm income.

Nonfarm Proprietors' Income

County estimates of nonfarm proprietors' income were derived in two steps. First, base-year distributions measuring net income in all nonfarm industries combined were prepared for 1929 and for 1950. That for the latter year was based on data collected in the 1950 Census of Population. The county distribution for 1929 was constructed from tabulations of Federal individual income tax returns filed in 1934. The 1950 benchmark was extended to 1940, 1955, and 1957 by an extrapolating series prepared as the sum of separate estimates for each of 12 industries.

The 1950 benchmark.—A county distribution of nonfarm proprietors' income in 1950 was obtained by allocating the total for each State in accordance with the distribution of county estimates constructed from the 1950 Census of Population.

This distributing series was derived by first computing aggregate income of all proprietors (farm and nonfarm) for the States, each standard metropolitan area, and all other counties combined—the last computed simply as the difference between the State total and that of all SMA's within it. Farm proprietors' income, estimated in a manner paralleling that for all proprietors' income, was deducted from the all-proprietors' series. The subtraction yielded estimates of nonfarm proprietors' income for each State, each SMA, and for all non-SMA counties combined. The total for counties lying outside SMA's was divided among individual counties in accordance with a relative distribution of the number of non-farm proprietors (total self-employed minus farmers) in each county with numbers weighted by average wages and salaries of employees in the trade and service industries.

The procedure used to allocate the residual nonfarm proprietors' income to counties not in an SMA was used also to separate individual counties within an SMA when necessary.

For the Delaware Area as a whole, self-employment income of nonfarm proprietors living in SMA's, for which the estimates are most adequate, accounted for five-sixths of the total.

The 1929 benchmark.—The county estimates of nonfarm entrepreneurial income for 1929 are weak. They were prepared by distributing State totals by adjusted county tabulations of proprietors' income reported by individuals on Federal income tax returns for 1934. Amounts of farm income deducted from these Internal Revenue figures were derived by distributing an estimated total for each State according to the county estimates of net farm income (described below).

The extrapolating series.—County estimates of the income of noncorporate nonfarm businesses in 1940 were obtained by extending the 1950 benchmark by a series representing the product of number of proprietors and average wages of employees. The initial benchmark was carried forward to 1955 and 1957 in accordance with rough estimates of changes in the volume of activity in firms of a comparatively small size.

The 1940–50 extrapolator was the product of number of nonfarm self-employed persons and average wages in each major industrial division. The number of self-employed persons in each industry was tabulated directly from the 1950 and 1940 censuses of population for the State and for standard metropolitan areas (large cities in 1940). The number of self-employed in each industry for all counties outside of SMA's was computed as a residual. This area figure was allocated to the constituent counties by the relative distribution of the total labor force in the particular industry.

Average wages in each industry were calculated for individual counties from UI wage and employment figures assembled in the preparation of estimates of covered payrolls, or from wage and employment data in *County Business Patterns*, a joint publication of the Department of Commerce and the Department of Health, Education, and Welfare. The industry figures prepared in the above manner were summed for each county and the total used to extend the 1950 estimates of proprietors' income to 1940.

The 1950 extrapolating series was extended to 1956, industry by industry, on the basis of changes in a county series derived as the product of employment in small firms (those with less than 4 employees) and average wages of all firms in each industry in the first quarter of 1951 and 1956. Requisite data were from *County Business Patterns*. The resulting county estimates in each industry were then adjusted proportionately to equal the independently estimated State totals of proprietors' income first in 1955 and then 1957. Total nonfarm proprietors' income in 1955 and 1957 derived as the sum of the individual industry estimates and the comparable series for 1950 were then used to extend the 1950 benchmark estimates to the latter 2 years.

Farm Proprietors' Income

Local area estimates of the net income of farm proprietors are equal to (and derived statistically as) the gross income of farmers minus their total expenses of production.

As in the case of nonfarm proprietors' income, the central feature of the farm income estimating procedure is the allocation of independent State totals to counties by means of the most relevant information available. The principal source of local data on farm businesses is the quinquennial censuses of agriculture, with the 1954 census data used for both 1955 and 1957. While the farm income estimates are subject to a wide margin of error, the effect of this on the personal income totals is slight throughout most of the Delaware Area because of the comparative unimportance of agriculture as a source of income.

State totals of the following five components of gross farm income were allocated to counties by data from the Census of Agriculture: (1) Cash receipts from farm marketings plus (2) the value (positive or negative) of the change in inventories of crops and livestock; (3) payments to farmers by Government; (4) the value of food and fuel produced and consumed on farms; and (5) the gross rental value of farm dwellings.

Similarly, the State totals of 10 items of farm production expense were allocated to counties primarily on the basis of census data. Detailed items fall generally under one of the following classes of production expense: purchases of livestock, labor, lime and fertilizer, and feed; depreciation of buildings, machinery, and equipment; operation of motor vehicles; payments of taxes, interest, and rents; and other miscellaneous expenses.

For a few income and expense items the county data reported in the censuses were satisfactory, but for most, indirect allocators were used. An example is the allocation of building depreciation in each of several years by the values of all farm buildings in a single year.

For other items little or no county data were available. In this class are expenses such as the value of inventory change or the cost of operating motor vehicles. In neither case are any direct data available, hence the State total of the value of inventory change was allocated along with farm marketings while the number of motor vehicles on farms served to apportion the cost of operating such farm machinery.

Property Income

Property income consists of dividends, personal interest income, and rental income of persons. In 1957, as noted, they accounted for approximately 13 percent of the personal income flow in the Delaware Area.

Paucity of county data on property income flows constitutes a particularly acute problem in the field of local-area income estimation. This situation almost always requires the use of indirect methods of estimation and results in comparatively weak—probably the weakest of the major components—estimates of rents, dividends, and interests for small areas.

This generalization holds true for the estimates of property income made for the Delaware River Area with one important exception. The county estimates of dividends and interest in the New York State portions of the overall area for 1950, 1955, and 1957 were based on special county tabulations of State income tax returns prepared by the New York State Department of Taxation and Finance. These tabulations proved a valuable acquisition even though it was recognized that they were subject to sampling errors in compilation and to potential errors of underreporting.

County estimates of property income were derived as the sum of separate estimates for the following components: dividends and private monetary interest combined, government interest, imputed rents, and all other property income (the last consisting of monetary rents and imputed interest).

Dividends and Interest

Special tabulations of dividends and interest received by residents of the various counties in New York State in 1949 and 1954 were obtained as noted above. These preliminary county figures were used to distribute the independently estimated State totals of dividend and (private monetary) interest receipts in 1950 and 1955 to the individual counties of New York State. The 1955 distribution was used to allocate the State total in 1957.

County estimates of dividends and interest were prepared for other States of the area from a regression equation based on the relationships between personal income excluding property income and dividends and interest receipts in New York counties.

Estimates for 1929 were prepared by allocating the State totals of private monetary interest and dividends according to the amounts of these items reported by residents of each county on their 1934 Federal income tax returns. County estimates for 1940 were derived by interpolation between the 1929 and 1950 figures on the basis of population.

Government interest payments to persons in 1950, 1955, and 1957 were allocated to counties in proportion to sales of series E or of series E and H bonds. County bond sales data were supplied by the Treasury Department. Estimates for 1950 were extrapolated to 1929 and to 1940 by population.

Imputed Property Income

Imputed rent measures the net income accruing to nonfarm residents in their capacity as homeowners. It equals the gross rental value of owner-occupied nonfarm houses less the actual expenses incurred in home ownership. A similar imputation for farm dwellings is included in the estimates of farm income.

County estimates of imputed net rent were prepared by allocating State totals by the market value of owner-occupied nonfarm homes as computed from census of housing reports. Estimated market value was prepared for 1930, 1940, and 1950 by multiplying the number of owner-occupied nonfarm homes in each county by average value. Both numbers of homes and average values were taken from censuses of housing, with certain adjustments made to secure comparability. Figures for 1950 were extended to 1955 and 1957 by changes in personal income excluding property income.

In the absence of information reflecting the amounts of imputed interest accruing to residents of the various counties, State totals of this item were allocated by all other property income flows combined. A similar procedure was followed for monetary rents. It should be noted, however, that although imputed interest and monetary rents make up one-fourth of all property income in the Delaware Service Area, they account for less than 5 percent of the total income flow.

Other Components

This final section describes how the estimates for the three remaining components of personal income were made. These include: "other" labor income, transfer payments, and personal contributions for social insurance. The last is treated as a "negative" component since it is excluded from personal income.

Other Labor Income

This category consists of supplementary types of labor income paid out or accruing to persons in the current period. These comprise employer contributions to private pension, health, and welfare funds; compensation for injuries; pay of military reservists; and a number of minor items consisting of directors' fees, jury and witness fees, compensation of prison inmates, and marriage fees to justices of the peace. Other labor income formed only 2 percent of personal income in the Delaware Area in 1957.

Employer contributions to private pension, health, and welfare funds are measured on a county basis according to the residence of employees for whom they have been made. Given a lack of direct data, they have been estimated in the county series by allocating State totals on the basis of payrolls. Because the ratio of employer contributions to wages and salaries differs widely by industries, this allocation has been carried out in considerable industry detail. A similar procedure was utilized for estimating compensation for injuries and directors' fees.

The remaining items of other labor income together account for less than one-tenth of the total. They have been apportioned to the counties in terms of total, civilian, or veteran population, according to the most appropriate available series.

Transfer Payments

Transfer payments consist in general of disbursements made to individuals by government or business for which no services are rendered currently. As noted, major examples of government transfers include unemployment benefits and relief payments. A principal category of business transfers consists of corporate gifts to nonprofit institutions (in personal income, nonprofit institutions are treated as persons).

The estimates of total transfer payments represent the summation of approximately 45 separate series. Some were obtained through a process of detailed data collection. Others were estimated by means of allocators which vary considerably, both in directness and relevancy.

Currently, directly reported data underlie the estimates of individual items that in combination account for a little more than half of total transfers nationally, although the proportion varies by areas. In general, these estimates are based on reports of disbursements obtained from the fiscal records of administering government agencies. Included here are benefits from such programs as old-age and survivors' insurance, State unemployment insurance, and various welfare and relief programs. Moreover, good indirect allocators were available for large segments of the remaining transfers. An example is afforded by the county distributions of veterans of World War II which were used to apportion certain of the veterans' payments. Transfer payments for which the statistical basis is weak comprise only a small part of total transfers and an almost negligible fraction of total personal income.

Personal Contributions for Social Insurance

Contributions made by individuals under the various social insurance programs are excluded from personal income by handling them as an explicit deduction item. Payments by both employees and self-employed are included in the series.

The employee portion covers contributions for old-age and survivors' insurance, State unemployment insurance, railroad retirement insurance, cash sickness compensation, and Federal and State and local public employee retirement systems, as well as premium payments for government life insurance. Contributions of the self-employed relate to old-age and survivors' insurance.

As no direct data on individuals' contributions for social insurance are available, the general procedure was to allocate State totals to the counties on the basis of payrolls or proprietors' income in the relevant category of employment. For the Government life insurance programs a specially weighted total of civilian population and military strength was used as the county allocator.